FUTURE BUDGET REQUIREMENTS FOR THE 600-SHIP NAVY: PRELIMINARY ANALYSIS

Staff Working Paper

April 1985

The Congress of the United States

Congressional Budget Office

J932-14

NOTE

Unless otherwise indicated, all years in this paper are fiscal years.

All numbers in this paper are in constant fiscal year 1986 dollars unless otherwise stated.

PREFACE

A key component of the Administration's program to improve U.S. defense capabilities is a buildup of naval forces which has come to be known by the sobriquet "the 600-ship Navy." In pursuit of this larger and more modern force, the Navy's budgets, as appropriated by the Congress, have been steadily increased over the Administration's tenure and currently (fiscal year 1985 appropriation) are about 40 percent above the fiscal year 1980 appropriation (in constant dollars). This preliminary analysis reviews progress made to date in the Administration's force buildup and presents some CBO projections of future Department of the Navy budgets that would be required to achieve and to sustain the larger and more modern Navy planned by the Administration. This paper presents the results derived to date for a study requested by the House Budget Committee. The Congressional Budget Office will publish a more thorough report of its analysis in the future. In keeping with CBO's mandate to provide objective and non-partisan analysis, this study makes no recommendations.

Peter Tarpgaard and Robert Mechanic of the Congressional Budget Office's National Security Division prepared this preliminary analysis, under the general supervision of Robert F. Hale and John D. Mayer, Jr. Eugene Bryton of the Budget Analysis Division provided some of the support cost estimates. The authors also gratefully acknowledge the assistance of G. William Darr, Patricia H. Johnston, Robert Kornfeld, V. Lane Pierrot, and R. William Thomas of the CBO staff.

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Director

March 1985

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SUMMARY

When the Administration assumed office in January 1981, it inherited a fleet of about 480 ships, including twelve deployable carrier battle groups. Considering this fleet inadequate for U.S. defense needs, the Administration established higher force goals in almost every ship category, with the objective of building up the total number of battle force ships to over 600 by the end of the 1980s. 1/ Other key goals were an increase in deployable carrier battle groups from 12 to 15 and a comparable increase in aircraft to fly from these carriers.

Concerns have been raised about the costs of attaining and maintaining this 600-ship Navy. Such concerns could be well-founded. From 1980 through 1985, the Navy's total budget grew at a real (inflation-adjusted) average annual rate of about 7 percent a year, or from $71.5 billion in 1980 (adjusted for accrual accounting) to $100.3 billion in 1985. This study estimates that, over the next decade, the Navy's budget would have to continue to increase at a real rate of between 3 and 6 percent a year to meet the Navy's goals. Such sustained growth would result in doubling the Navy budgets in constant dollars between 1980 and 1994.

NAVY'S GOALS FOR SHIPS AND AIRCRAFT

The Navy should meet its 600-ship goal by the end of this decade. Primarily as a result of completing many of the 100 ships authorized in earlier years and still under construction as the Administration assumed office in 1981, the number of battle force ships grew over the past four years from 480 to a total of 528 ships as of January 30, 1985. In the meantime, the Administration requested and Congress provided a series of larger shipbuilding budgets, which averaged about 50 percent higher over the four-year period than those of the preceding Administration. The ships resulting from the fiscal

1. The 480 total is for "battle forces," that is, ships that participate in or directly support combat operations. In addition, about 60 support ships and older reserve force combatants were in commission in 1981 but were not counted among the battle forces. Usually one more aircraft carrier exists than those that are termed "deployable" carriers, since one normally is undergoing a Service Life Extension Program (SLEP) overhaul and is not available for deployment while in that status.

years 1982 through 1985 authorizations will start to enter the fleet around 1986 and 1987. The influx of these ships, coupled with an unusually low number of ship retirements projected for the remainder of the 1980s, should enable the Navy to realize the nominal goal of 600 ships in the battle force by the end of the 1980s.

Despite its symbolic importance, however, attainment of a battle force ship count of 600 does not fulfill all the Administration's naval goals. Still higher levels of shipbuilding authorizations will be required in the future to achieve specific force structure and modernization goals beyond the general objective of 600 ships. These include such specific objectives as obtaining 15 deployable carriers and the modern escorts to accompany them, increasing the number of attack submarines from 90 to 100, increasing amphibious lift capability by 50 percent, and continuing the replacement of retiring ships with modern (and more expensive) versions. It is expected that these goals will require continued real growth in the shipbuilding and conversion (SCN) budget averaging at least 5 percent annually into the mid-1990s.

The Administration also plans to increase and to modernize Navy and Marine Corps combat air forces. The Navy plans to increase the number of carrier air wings in the active-duty Navy from 12 to 14. (An air wing consists of 80 to 90 aircraft that operate off an aircraft carrier, but about 50 percent more airplanes per wing need to be procured to provide for training and support requirements.) The additional wings are needed to compliment the expansion of deployable aircraft carriers to 15. The Navy also plans to modernize its air wings according to a new plan that calls for more medium attack aircraft (the A-6) but fewer light attack aircraft than in the past. The Navy will continue to retain older aircraft, however, and current force plans will result in an average retirement age of 24 years.

In contrast to the 600-ship goal, the Navy will probably not reach its aircraft goals over the next five years. According to CBO analysis, by 1992 --when all the aircraft purchased over the next five years will be operational--the Navy will still be short 366 aircraft of nine different types and will have an excess of 239 aircraft of five other kinds. For a more thorough discussion of Navy tactical air issues, see the CBO Staff Working Paper, Combat Aircraft Plans in the Department of the Navy: Key Issues (March 1985).

FUTURE BUDGET PROJECTIONS

Significant changes in the Navy normally occur only over extended time periods. Not only is much time needed to develop and procure complex

modern naval weapons, but, once acquired, they often remain in service for 20 to 30 years or longer. Therefore, in order to gain a true perspective of the cost implications of the kind of force buildup now being pursued by the Administration, it is necessary to make very long-range projections of future budget requirements. Although long-term budget forecasting is an art subject to many uncertainties, it is useful to make such projections to illustrate the ultimate effect of current policy decisions.

The methodology and assumptions used by CBO to make these projections are outlined in subsequent sections of this report. Basically, for the investment accounts, CBO made specific year-by-year estimates of future ship and aircraft procurements, using current Navy plans, when available. Further, for the years beyond published plans, CBO made estimates based on maintaining current force goals and on replacing retiring ships and aircraft with modern units of current or currently planned types. Other investment expenses—for research and development, missiles, torpedoes, munitions, support equipment, Marine Corps equipment, military construction, and so forth—were assumed to retain their recent levels as a percent of the total Department of the Navy budget. These accounts, totaling about 22.5 percent of the Department of the Navy budget, have retained a relatively stable share of the budget in the past.

To estimate support costs—mainly the operation and maintenance and the military personnel accounts—CBO used three different approaches:

- CBO's **Defense Resource Model** (DRM), a computer program that estimates future budget requirements based on current budgetary levels for "program elements" (the various kinds of ships, aircraft, and support functions) as related to projected future force levels.

- The **Resource Dynamics Navy Model,** developed under the sponsorship of the Office of Naval Research at George Washington University, that employs a variety of estimating methods and uses the total value of the Navy's ships and aircraft as a parameter for estimating future support costs.

- A **ratio to fleet value** approach, a simple technique that assumes that future support costs will retain their historic level as a percent of total fleet (ships plus aircraft) value.

Using these methodologies, CBO has projected future budget requirements for achieving and sustaining the Navy's stated force level and modernization goals. Probable future requirements are bracketed by the following illustrative cases:

- **Case I:** Assumes no real growth in procurement prices and assumes the lowest support costs projected by the computer models used in this analysis. This results in a minimum projected budget requirement.

- **Case II:** Assumes an average 3 percent annual real growth in procurement unit prices (typical of recent experience) and the higher of the support costs projected by the computer models used in this analysis. This results in a middle-range projection.

- **Case III:** Assumes an average 3 percent annual real growth in unit procurement prices and that support costs remain at their recent level as a fraction of total fleet (ships plus aircraft) value rather than as a declining fraction, as both computer models suggest. This results in the highest of the three budget projections.

These three cases produce average annual increases in the total Navy budget ranging from 2.9 percent to 5.6 percent through 1994, as shown in the following table.

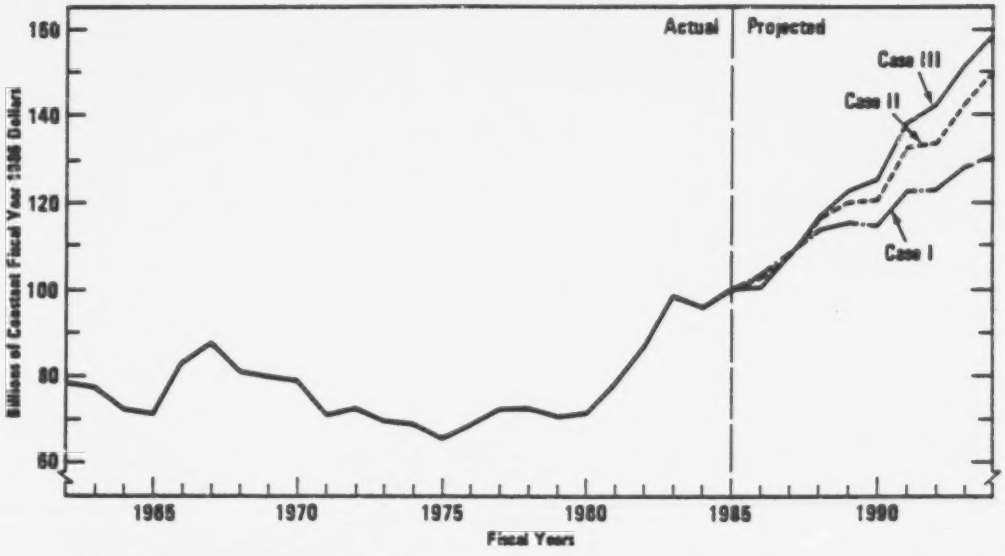
Case	Fiscal Years 1985-1994 Annual Real Growth Rate (In percents)	Fiscal Year 1994 Budget Estimate (In billions of Fiscal Year 1986 dollars)
I	2.9	130.7
II	4.6	150.1
III	5.6	158.6

These increases reflect investment costs that grow between 4.5 percent a year (in Case I) and just over 7.0 percent a year (in Cases II and III), and support costs that also grow, but always at a slower rate. By 1995 the projected budgets have a ratio of investment to support costs ranging from 1.1 (Case I) to 1.34 (Case III), well above today's level of 0.9 or the 1970s average of 0.73. If this projection of declining support expenditures relative to investment is not fully realized, these estimates could understate actual budget requirements.

Continued real annual budget growth of 3 to 6 percent to the mid-1990s may be difficult to achieve if history is a guide. The Summary Figure

Summary Figure.

Alternative Cases for Navy Budget Projections



SOURCE: Congressional Budget Office.

plots these projections of future budget requirements, together with actual appropriations for the Department of the Navy back to fiscal year 1962. The Department of the Navy budget was remarkably stable, after adjustment for inflation, during the 1960s and 1970s (apart from a modest increase during the Vietnam War years), with no period of real growth exceeding three years during this long period. The results of CBO's analysis, however, indicate a need for sustained growth for an additional nine years beyond 1985 to achieve and sustain current naval force objectives. If this occurs, Department of the Navy budgets will have grown to about double the 1960s-1970s norm before they begin to level off again in the mid-1990s.

CHAPTER I. ADMINISTRATION NAVAL OBJECTIVES: PROGRESS AND PLANS

In testimony before the Congress and in public statements, the Administration has outlined in some detail its plans for building up U.S. naval strength. Some major objectives included in these plans are:

- Increase the number of battle force ships to 600.
- Increase the number of deployable carrier battle groups from 12 to 15.
- Increase the number of active carrier air wings from 12 to 14.
- Increase the number of nuclear-powered attack submarines to 100.
- Increase amphibious lift capability by about 50 percent.
- Modernize the force with new ships and aircraft designed to meet the threat posed by the capabilities of potential enemies.

In order to accomplish these and other objectives, the Administration has requested (and the Congress approved) a series of sharp budget increases during its first term. The Department of the Navy budget appropriated for fiscal year 1985 ($100.3 billion) was fully 40 percent, in terms of dollars of constant purchasing power, above that of fiscal year 1980. With this increase in resources, some progress already has been realized in meeting the Administration's goals, and more will come in the future as a result of funds previously appropriated.

SHIP FORCE LEVELS

The number of ships in the Navy's battle fleet has increased from about 480 in January 1981 to 528 in January 1985, an increase of 10 percent. Almost all this growth is a result of completing ships that were authorized under previous administrations. Ships resulting from Reagan Administration authorizations will start arriving in the fleet in significant numbers around 1986 to 1987, at which time the fleet will contain about 550 ships. Ships authorized in the fiscal years 1981 through 1985 shipbuilding budgets, which

have averaged about 50 percent more, in constant dollars, than those of the previous Administration, will push the fleet count over 600 by fiscal year 1990. Approval of all or most of the ships in the Administration's Five-Year Shipbuilding Plan for fiscal years 1986 through 1990 would sustain a level above 600 into the mid-1990s, after accounting for the retirement of older ships. CBO's projection of total battle force ships to the end of the century is shown in Figure 1.

Ship retirement policies also influence the growth of the fleet. From fiscal years 1981 through 1984, annual retirements averaged about 10 ships a year, compared with 21.4 ships a year in the previous five years. These lower retirements, which reflect policy choices as well as the age pattern of older Navy ships, contributed to the growth in the fleet. Since the Navy does not make its future retirement plans publicly available beyond the current budget year, this study assumes retirement ages roughly consistent with past policies. Aircraft carriers are assumed to retire at 45 years of age, auxiliaries at 40 years, and other ships at 30 years. Differences between these assumptions and actual plans could account for fleet sizes that differ from Navy projections.

FLEET MODERNIZATION

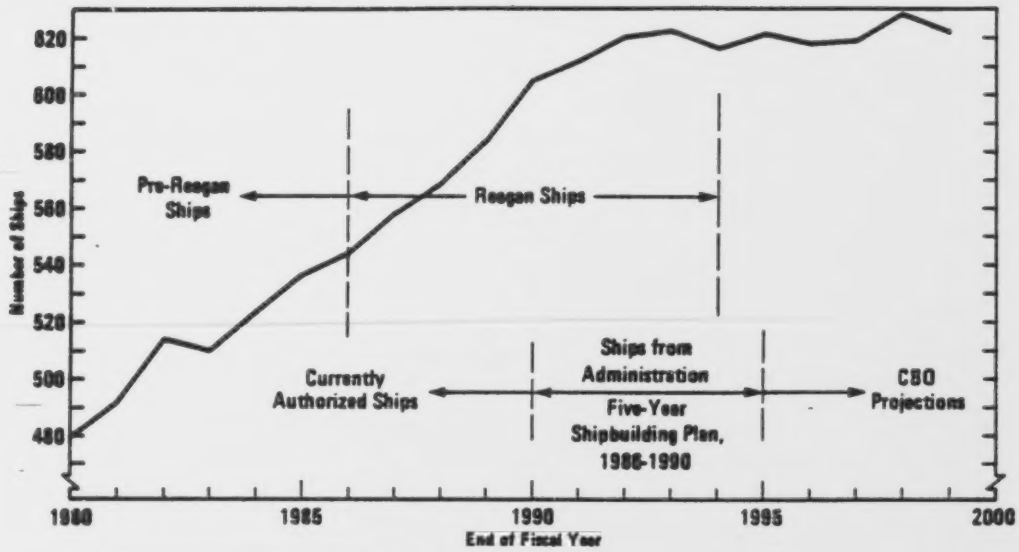
Modernization of the fleet will be a still lengthier and more expensive process than the buildup to 600 ships. The main reason for this is that new ships tend to be much more expensive than the ships they replace, which means that relatively few can be procured each year (even with generous budgets) and thus replacement proceeds slowly. The projected modernization status of the fleet in 1989, the year the Administration expects to reach the 600-ship goal, is shown in Tables 1 and 2. A "modern ship" is defined as one belonging to a class designed in a period around or after 1970. Older ships would be at or beyond 20 years of service by 1989. The substantial expense of modernizing some ship types is illustrated by the case of the guided missile destroyers (DDGs). Realization of the Navy's modernization plans would require 62 more modern DDGs of the DDG-51 class (or latter follow-on classes) that would cost a total of about $50 billion, assuming the Navy's current price estimate for the DDG-51 class destroyers. Modernization will be a continuing process throughout the period examined in this study.

EXPANDED AND MODERNIZED FORCES: GOALS AND PROGRESS

This section discusses the Navy's force level and modernization goals for ships and aircraft and reviews progress in realizing them.

Figure 1.

CBO Projections of Navy Battle Force Ships



SOURCE: Congressional Budget Office based on Navy Department data.

TABLE 1. PROJECTED FLEET MODERNIZATION STATUS FOR COMBATANTS IN FISCAL YEAR 1989 (In ships)

Ship Type	Force Objective a/	Available 1989	
		Modern Ships b/	Earlier Classes
Cruisers (CG)	27	16	18
Destroyers (DDG)	67	5	32
Destroyers (DD)	37	31	0
Frigates (FFG/FF)	101	51	65
Submarines (SSN)	100	47	60
Total	332	150	175
Percent of Objective	--	45	--

SOURCE: Congressional Budget Office.

a. Testimony of Vice Admiral Robert L. Walters to the Seapower and Strategic and Critical Materials Subcommittee of the House Committee on Armed Services, March 4, 1982.

b. Modern means ships in classes substantially designed and built after 1970 which includes the following classes: CG-47, DDG-51, DDG-993, DD-963, FFG-7, and SSN-688.

TABLE 2. PROJECTED FLEET MODERNIZATION STATUS FOR OTHER SHIP TYPES IN FISCAL YEAR 1989 (In ships)

Ship Type	Modern Ships	Earlier Classes	Percent Modern
Amphibious Ships	14	52	21
Underway Replenishment Ships	15	41	27
Support Ships	33	20	62
Mine Warfare Ships	14	--	100

SOURCE: Congressional Budget Office.

Aircraft Carriers

Carrier battle groups, considered by most to be the centerpiece of the Navy's general purpose forces, are a key component of the Administration's naval plans. When the Administration took office, the fleet contained a total of 13 aircraft carriers, one of which was temporarily decommissioned while undergoing an extensive overhaul under the Service Life Extension Program (SLEP). (Because it is anticipated that one carrier will be in SLEP through the end of the century, "deployable" carriers will be one less than the total carriers in the fleet.) The 1982 commissioning of USS Carl Vinson (CVN-70), which had been authorized in 1974, brought the number of deployable carriers to 13; and a fourteenth carrier, authorized in 1980, should join the fleet in 1987. Two additional carriers, authorized in 1983, are scheduled for commissioning in 1990 and 1992. When the last of these new carriers joins the fleet in 1992, one of two remaining World War II vintage carriers will be retired to training duty, leaving the number of deployable carriers at 15.

Although planned procurements of carriers will allow the Navy to attain a fleet of 15 deployable vessels by the early 1990s, purchases will have to continue throughout the 1990s if that fleet is to be maintained. Assuming retirement at 45 years of age, eight carriers will leave the fleet in the first decade of the next century. Their replacements would have to be authorized in the 1990s to ensure their timely construction. This study assumes that the new purchases would be large, Nimitz-class carriers.

Attack Submarines

The Administration has increased the Navy's planning objective for nuclear-powered attack submarines (SSNs) from 90 during the Carter Administration to 100 units currently. The number of SSNs authorized each year has been steadily increased from one in 1978 and 1979 to two in 1980 through 1983, three in 1984, and four authorized in 1985 and requested for 1986. Achieving and sustaining the objective of 100 units will depend upon the service life extracted from existing SSNs. If SSNs are operated for about 30 years, the objective should be met easily (given current and planned new construction). If, on the other hand, SSNs are retired at 25 years of service, the force level will settle at about 90 units. This is shown in Table 3.

The Navy's five-year shipbuilding plan includes a total of 18 SSN-688 class submarines and one new-design SSN in fiscal years 1986 through 1990. This study assumes continued procurement of three or four new-design SSNs in the years beyond 1990 in order to maintain the force level of 100 as older units are retired.

Amphibious Lift

In fiscal year 1980, the Navy's amphibious lift capability--that is the capacity to carry Marine Corps troops and equipment in ships designed to support amphibious landings--was judged sufficient for just over one Marine Amphibious Force (MAF), which has about 32,500 troops. The Administration proposes to increase amphibious lift to a capacity sufficient to support 1.5 MAF, or about 48,000 troops and their equipment. A total of seven amphibious ships have been authorized in fiscal years 1981 through 1985--six landing ships dock (LSDs) and one amphibious assault ship (LHD). The LSDs are intended to replace an earlier class of the same type now being retired, and the LHD is similar to an earlier type of amphibious ship, designated LHA, built in the 1970s. The 1986 through 1990 shipbuilding plan includes eight additional LSDs, four LHDs, and a service life extension program for seven older amphibious transports dock (LPDs) in the fiscal years 1988-1990 period. No amphibious ships at all were authorized in the period 1972 through 1980. In the years beyond 1990, this study assumes continued replacement of amphibious vessels with the most modern classes of ships.

TABLE 3. PROJECTED ATTACK SUBMARINE FORCE LEVELS, ASSUMING RETIREMENT AFTER 25 AND 30 YEARS OF SERVICE (By fiscal year)

Number	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Assuming 30-Year Service Life										
Added		3	3	3	5	4	4	4	4	3
Retired		0	1	2	2	5	1	4	4	2
At End of Year	98	101	103	104	107	106	109	109	109	110
Assuming 25-Year Service Life										
Added		3	3	3	5	4	4	4	4	3
Retired		11	4	4	2	4	0	3	6	6
At End of Year	98	90	89	88	91	91	95	96	94	91

SOURCE: Congressional Budget Office, based on Navy Department data.

Aircraft Requirements 1/

Navy aircraft needs will grow from about 3,800 planes today to about 4,100 in fiscal year 1992. This growth reflects the increasing needs of both the Navy, as it expands the number of aircraft carriers, and of the Marine Corps. Specifically, a thirteenth carrier air wing was added in fiscal year 1984 and a fourteenth is planned for fiscal year 1987. (Each carrier air wing consists of 80 to 90 planes deployed at sea plus associated support aircraft.) In addition, the Navy has two reserve air wings that it plans to maintain and modernize throughout the forseeable future.

At the same time the Navy is increasing its demand for aircraft, it is also planning to modernize its entire air fleet according to a new "notional" air wing. (Notional air wings are used for procurement planning purposes.) As Table 4 shows, this new notional air wing features more medium attack aircraft (A-6s) that can carry large payloads for long distances and fewer light attack aircraft.

The Navy probably will not meet its aircraft goals, considering the current five-year plans for procurement and retirement. By 1992--when all the aircraft purchased over the next five years are in the fleet--CBO estimates that the Navy would be short 366 aircraft of nine different types, but would have an excess of 239 aircraft of five other types. The largest shortfall would be of A-6 aircraft; the largest excess would be of F/A-18s.

In making projections of future aircraft procurement, this study follows Navy plans in the next five-year period. But, in the years beyond fiscal year 1990, the study assumes that the Navy will buy enough aircraft to meet all its requirements by 1997, when all the aircraft purchased by 1995 are in the fleet. It also assumes that the Navy uses the new notional air wing, its planned retirement ages (which average 24 years for all types of aircraft), and other planning factors.

OTHER OBJECTIVES

The Administration has also established a host of additional objectives too numerous to review in this summary. These include such things as building up the numbers of military personnel and the civilian work force and improving the readiness and sustainability of the forces. These activities

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1. See Congressional Budget Office, Combat Aircraft Plans in the Department of the Navy: Key Issues, Staff Working Paper (March 1985).

would require increases in the support accounts (Military Personnel and Operation and Maintenance) as well as increases in expenditures for procuring weapons, munitions, and spare parts. Department of the Navy support costs increased by 28 percent in real terms (including adjustment for accrual retirement accounting) between fiscal years 1980 and 1985.

Navy plans for most of these additional objectives are not publicly available in specific terms beyond the current budget year. A later section of this report describes the methodology used in estimating future Navy budgets.

TABLE 4. NUMBERS OF AIRCRAFT UNDER ALTERNATIVE NEW AND OLD WING COMPOSITIONS

Aircraft Types	New (Notional)	Old
Fighter/Interceptors		
F-4 and F-14	20	24
Attack Aircraft		
A-6 medium attack a/	20	14
A-7 light attack b/	0	24
Dual Purpose (Light Attack or Fighter)		
F/A-18 b/	18	0
Antisubmarine Warfare		
S-3	10	10
SH-3/SH-60 helicopters	8	6
Other		
EA-6	5	4
E-2	5	4
Total	86	86

SOURCE: Department of the Navy.

a. Some of the A-6 would be KA-6, a tanker version that performs aerial refueling.
b. F/A-18s will replace A-7s.

CHAPTER II. NAVY BUDGETS AND RECENT TRENDS

The budget is not only an account of the resources available to an organization but it is also a barometer indicating trends in activities and objectives. Resources are measured by the actual amounts contained in the budget for any given period. A barometer of activities and objectives is provided by changes in those amounts from one period to another and by assignment of shares of total funds to various activities. CBO's estimates of future Navy budgets are influenced not only by force plans discussed above but also by past budget trends that suggest areas of future need and that motivate estimating methods.

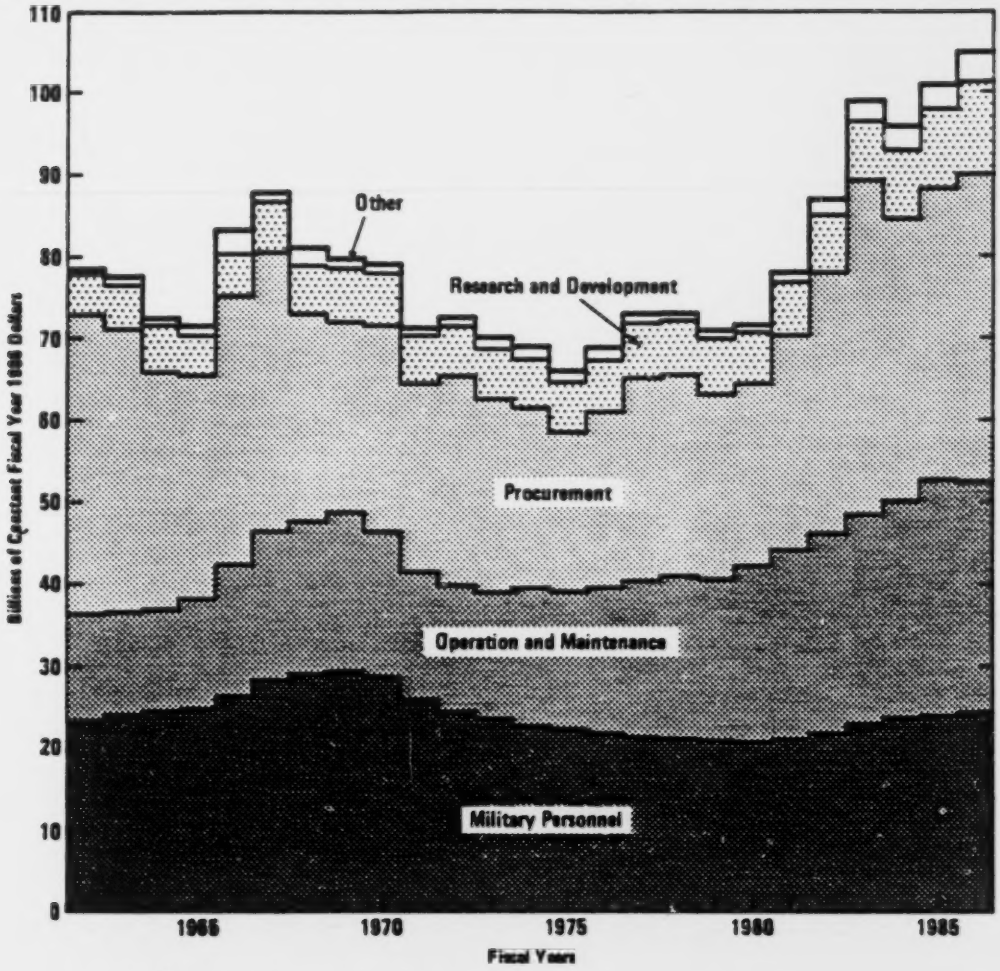
THE STRUCTURE OF THE NAVY BUDGET

The Navy budget, like that of the other services, is divided into various categories or accounts which, in turn, are further divided at successive levels into increasingly narrow applications. The major accounts of the Navy budget are listed in the accompanying box. It is trends at or above the level of these budget allocation categories that are discussed in this study. As indicated in the box, some of these categories are commonly referred to as the investment accounts—procurement; research, development, test, and evaluation (RDT&E); and military construction. The other categories--personnel and operation and maintenance--are termed the support accounts. In this discussion, all military personnel (MILPERS) accounts are combined into one total, and all operation and maintenance (O&M) accounts are similarly amalgamated into one total.

NAVY BUDGET TRENDS

Trends in the Department of the Navy budget for fiscal years 1962 through 1986 are shown in Figure 2. As has the entire defense budget, the Department of the Navy budget has grown substantially from fiscal year 1980 through fiscal year 1985, with a total increase of 40 percent, in constant dollars. The Administration proposes a further real increase of 4.5 percent--to a total of $104.9 billion—in its fiscal year 1986 budget.

Figure 2.
Navy Budgets, Fiscal Years 1962-1986[a]
(Includes Adjustment for Accrual Accounting for Military Retirement)



SOURCE: Congressional Budget Office based on data from the Department of Defense.

[a]The fiscal year 1986 budget is the Administrations request.

BUDGET SHARES WITHIN THE DEPARTMENT OF THE NAVY

Figure 2 also shows how the Navy budget has been allocated among various major categories--military personnel, operation and maintenance, procurement, RDT&E, and other accounts. Although the allocation of the available budget resources among these categories has been the subject of continuing debate and decision in the budgetary process, the relative shares alloted to these various functions over the years have remained fairly stable. This is illustrated in Table 5 in which the budget shares appropriated by Congress in the fiscal year 1985 budget are compared with a typical share derived by calculating the average share for the previous ten years. Over that ten-year period the portion of the budget allocated to any given category might fluctuate by as much as two or three percentage points, but relative stability was the norm.

DEPARTMENT OF THE NAVY BUDGET CATEGORIES

Investment Accounts

APN — Aircraft Procurement, Navy
WPN — Weapons Procurement, Navy
SCN — Shipbuilding and Conversion, Navy
OPN — Other Procurement, Navy
PMC — Procurment, Marine Corps
RDT&EN — Research, Development, Test and Evaluation, Navy
MCON — Military Construction, Navy

Support Accounts

MPN — Military Personnel, Navy
RPN — Reserve Personnel, Navy
MPMC — Military Personnel, Marine Corps
RPMC — Reserve Personnel, Marine Corps
O&MN — Operation and Maintenance, Navy
O&MNR — Operation and Maintenance, Naval Reserve
O&MMC — Operation and Maintenance, Marine Corps
O&MMCR — Operation and Maintenance, Marine Corps Reserve

Investment Versus Support

The sharp increase in defense spending since fiscal year 1980 has featured a strong emphasis on procurement. For the Department of Defense (DoD) as a whole, procurement increased by 99 percent in terms of constant dollars from fiscal years 1980 through 1985, while operation and maintenance grew by only 32 percent in the same period. This has led to concern among many

TABLE 5. DEPARTMENT OF THE NAVY BUDGET SHARES (As a percent of the total Navy budget)

Account	Average Share Fiscal Years 1975-1984 a/	Approved Budget Fiscal Year 1985 b/
Investment		
Aircraft Procurement	10.4	12.1
Weapons Procurement	4.6	4.8
Shipbuilding & Conversion	13.8	13.0
Other Procurement	5.6	5.9
Marine Corps Procurement	1.3	2.0
Subtotal, Procurement	(35.7)	(37.8)
Military Construction	1.5	1.8
Research & Development	9.6	10.2
Total Investment	46.8	49.8
Support		
Operation & Maintenance	30.1	30.6
Military Personnel	21.1	18.3
Other	1.8	1.3
Total Support	53.0	50.2

SOURCE: Congressional Budget Office, based on Department of Defense data.

a. Numbers may not add to totals because of rounding.
b. Adjusted to remove retirement accrual.

defense observers that support was being neglected in the rush to buy large numbers of new (and expensive) weapons--weapons that will require still higher expenditures for their continuing support in future years. There are valid reasons for support costs to lag behind procurement, but the prospect of higher support costs in the future and the ultimate amount of those higher support costs are legitimate areas for concern.

For the Navy, the divergence between procurement and O&M has not been as marked as in the overall DoD budget. In the 1980-1985 period, procurement spending for the Navy increased 60 percent, in terms of constant dollars, while O&M funding increased by 51 percent.

A somewhat broader measure for assessing this relationship is the ratio of the investment accounts (procurement, RDT&E, and military construction) to the support accounts (operation and maintenance, military personnel, and stock funds). A plot of this ratio for the Department of the Navy for the fiscal year period from 1962 through 1985 is displayed in Figure 3. 1/ This ratio, which averaged about .73 during the decade of the 1970s, climbed sharply in the 1980-1983 period but has fallen back in the past two fiscal years. The investment/support ratio for the Administration's proposed Navy budget for fiscal year 1986 is .93, still well above the level of the 1970s. This suggests the importance of estimating future support costs, one of the key topics of the next chapter.

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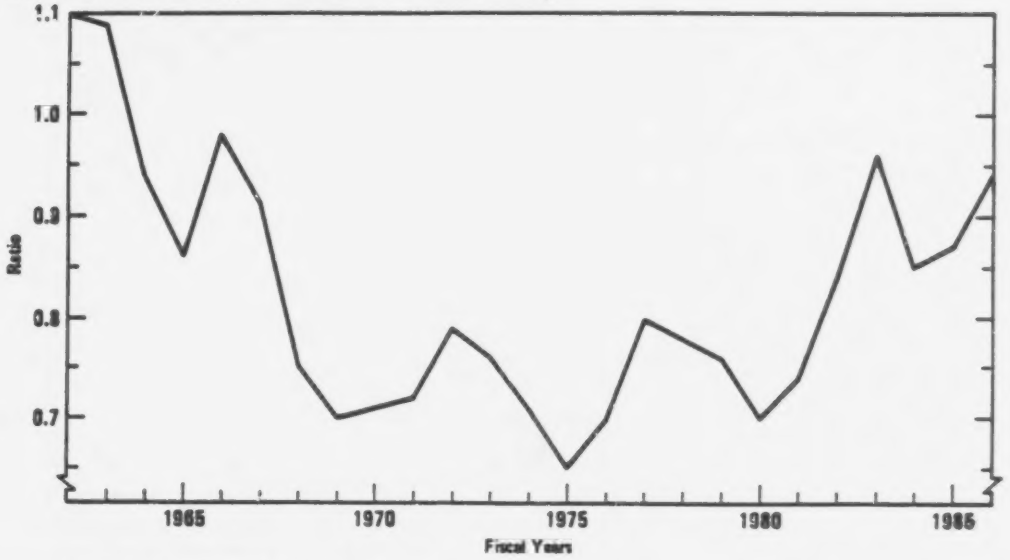
1. Prior to fiscal year 1985, military retired pay for all services was paid from a separate Department of Defense budget account appropriated each year and retired pay was not included within the budget of the individual services. Beginning in 1985, the budgeting system was changed to require an accrual charge each year in the military personnel account of each service to build a fund from which future retired pay disbursements would be made. Except where otherwise noted, all budget figures quoted in this study for fiscal years before 1985 have been adjusted to reflect what CBO estimates they would have been if the current accrual system for retired pay had been in effect in those years. Such adjustment is necessary when comparisons are to be made for years before and after this accounting change was put into effect. Because of this adjustment, historical budget figures quoted in this study may differ from those quoted elsewhere when such an adjustment has not been made.

Figure 3.
Investment/Support Ratio for the Navy



SOURCE: Congressional Budget Office.

CHAPTER III. CBO METHODOLOGY FOR ESTIMATING FUTURE NAVY BUDGET REQUIREMENTS

This chapter describes the methodology used by CBO to develop estimates of future Department of the Navy budget requirements. This includes estimates of investment necessary to achieve the Administration's force level and modernization goals and estimates of support budgets to maintain a larger and more modern fleet.

INVESTMENT COSTS

The two most significant investment accounts are Aircraft Procurement (APN) and Shipbuilding and Conversion (SCN). These were assessed directly, year by year, by estimating the numbers and types of ships and aircraft that should be procured each year to reach and sustain the Navy's force objectives. Administration plans from the Five-Year Defense Plan (FYDP), when available, were assumed for fiscal years 1986 through 1990. CBO made independent projections of APN and SCN requirements for the period beyond 1990, based on an assessment of procurements needed to achieve the Navy's force goals and to replace units that would reach normal retirement age. The assumed shipbuilding plan through the year 2000 is shown in Table 6. Aircraft procurement is discussed in more detail in the CBO Staff Working Paper, Combat Aircraft Plans in the Department of the Navy: Key Issues (March 1985).

The shipbuilding plan displayed in Table 6 shows the numbers of ships of various types that should be authorized each year through fiscal year 2000 and the estimated costs expressed in terms of fiscal year 1986 authorization dollars. The estimates for fiscal years 1986 through 1990 are taken from the Navy's current Five-Year Shipbuilding Plan. The subsequent years are based on CBO's assessment of shipbuilding needs to maintain current force level goals given ship retirements that should occur in the mid-1990s and beyond.

In addition to ships and aircraft, the Navy and Marine Corps make investment expenditures each year in other accounts for weapons (WPN), other procurement (OPN), Marine Corps procurement (PMC), research and development (RDT&E), and military construction (MCON). This study assumes that these categories of spending will retain about the same shares of the total Navy budget that they had, on average, in the fiscal years 1975-

TABLE 6. ASSUMED SHIPBUILDING PLAN FOR FUTURE SHIP REQUIREMENTS, FISCAL YEARS 1986-2000 (In units and billions of 1986 dollars)

Ship Type	1986		1987		1988		1989		1990		1991		1992		1993	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
Aircraft Carrier-CVN															1	3.5
Strategic Submarine-SSBN	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6
Attack Submarine-SSN	4	2.7	4	2.9	4	2.7	3	3.1	4	2.8	3	4.5	4	6.0	3	4.5
Cruiser-CG	3	2.8	3	2.8	3	2.9	2	2.0								
Destroyer-DDG			2	2.1	5	4.1	5	4.0	5	4.0	5	4.0	5	4.0	5	4.0
Destroyer-DD											1	0.6	2	1.2	2	1.2
Frigate-FFG											1	0.7			3	1.5
Assault Ship-LHD	1	1.5			1	0.9	1	0.6	1	1.3	1	1.4	1	1.4	1	1.4
Landing Ship-LSD/LPD	2	0.4			2	0.5	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5
Mine Warfare Ship-MCM	4	0.3	1	0.1												
Mine Warfare Ship-MSH	4	0.2	4	0.2	4	0.2	4	0.2								
Ammunition Ship-AE					1	0.4	1	0.3	1	0.3						
Stores Ship-AFS											1	0.3	1	0.3	1	0.3
Fast Support Ship-AOE			1	0.7	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5		
Fleet Oiler-AO	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3						
Tender-AR/AD/AS									1	0.5	1	0.5	1	0.5	1	0.5
Miscellaneous Ships	2	0.1	2	0.1	1	0.1	—	—	1	0.1	2	0.2	2	0.2	2	0.2
Total, New Construction	23	9.9	20	10.8	25	14.2	22	13.1	19	11.9	19	14.8	20	16.2	22	19.2
Conversions & Other Costs		1.5		2.3		1.4		1.4		1.8		2.6		2.9		3.4
Total, Shipbuilding and Conversion		11.4		13.1		15.6		14.5		13.7		17.4		19.1		22.6

(Continued)

TABLE 6. (Continued)

Ship Type	1994 Quantity	1994 Cost	1995 Quantity	1995 Cost	1996 Quantity	1996 Cost	1997 Quantity	1997 Cost	1998 Quantity	1998 Cost	1999 Quantity	1999 Cost	2000 Quantity	2000 Cost
Aircraft Carrier-CVN	1	3.5	1	3.5					1	3.5	1	3.5	1	3.5
Strategic Submarine-SSBN	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6
Attack Submarine-SSN	3	4.5	3	4.5	4	6.0	4	6.0	3	4.5	3	4.5	4	6.0
Cruiser-CG														
Destroyer-DDG	5	4.0	5	4.0	5	4.0	5	4.0	5	4.0	5	4.0		
Destroyer-DD	2	1.2												
Frigate-FFG	5	2.5	5	2.5	5	2.5	5	2.5	5	2.5	5	2.5	5	2.5
Assault Ship-LHD	1	1.4			1	1.4	1	1.4						
Landing Ship-LSD/LPD	2	0.5	2	.5	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5
Mine Warfare Ship-MCM														
Mine Warfare Ship-MSH														
Ammunition Ship-AE			1	0.4	1	0.4								
Stores Ship-AFS							1	0.3						
Fast Support Ship-AOE					1	0.5								
Fleet Oiler-AO	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
Tender-AR/AD/AS	1	0.5	1	0.5					1	0.5	1	0.5	1	0.5
Miscellaneous Ships	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
Total, New Construction	24	20.1	22	17.9	23	17.3	22	16.7	21	17.5	21	17.5	17	15.0
Conversions & Other Costs		3.5		3.2		3.1		2.9		3.1		3.1		2.6
Total, Shipbuilding and Conversion		23.6		21.1		20.4		19.6		20.6		20.6		17.6

SOURCE: Congressional Budget Office

1984 period. As discussed in the previous section, this is a reasonable assumption based on historical data.

In estimating the costs of ships and aircraft, CBO assumed in its basic calculations that future procurement costs for each item will remain at the same real level as in the 1986 budget (or, when planned procurement begins after 1986, at the inflation-adjusted 1986 level in those future plans). Experience suggests, however, that unit prices could increase at rates faster than the rate of inflation. Real increases in unit procurement costs result from improvements to weapons systems and other factors. As a rough guide to possible price growth in the future, CBO reviewed the procurement prices of a representative group of ships procured in the early 1960s and compared them with the prices of similar ships procured in the 1980s, making suitable adjustments to account for the effects of inflation. This comparison indicated an average real growth rate of about 3 percent per year in the price of Navy ships over the past two decades. A similar comparison was made for aircraft in the period between fiscal years 1980 and 1986, which indicated an annual real growth rate of 3.8 percent for aircraft. In view of this evidence of previous real growth in procurement prices, CBO superimposed an annual real growth rate of 3 percent per year on the procurement accounts in two of the three budget projection cases described below.

SUPPORT COSTS

Support costs are dominated by the military personnel and operation and maintenance accounts. 1/ Navy estimates of MILPERS and O&M, which together account for about half of the fiscal year 1986 Department of the Navy budget request, are not normally published beyond the current budget year. Estimating funding requirements for these accounts is a key task for projecting future budget levels.

For estimating future O&M and MILPERS budget requirements, CBO used three different methods--two alternative computer models and a ratio to force value approach. The computer models were the Defense Resources Model (DRM), developed by CBO, and the Resource Dynamics Navy Model (RESDYN), developed by the Office of Naval Research at George Washington University.

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1. Other minor accounts are also counted as support costs in this study, namely, the Navy and Marine Corps Stock Funds and Navy and Marine Corps Family Housing, which together account for about 1.5 percent of the total Navy budget.

The Defense Resources Model

The DRM uses a "program factor" approach to budget estimating--that is, it relates support costs to forces by assigning an annual support cost to each major unit. These support cost factors are derived from a review of recent budget data. It is a rather complex model that estimates budget requirements according to the following rules:

- Support funding for each ship, aircraft, other item of major equipment, and facility already in the inventory continues at levels proposed by the Department of Defense for the current budget year, as amended by Congressional action. Future changes in support funds for existing equipment and facilities are assumed to result solely from equipment retirements.

- Support funding for each new ship, aircraft, other item of equipment, or facility that enters the inventory is determined by the best available estimate of costs per unit. Such estimates are obtained from the Armed Services or, if unavailable, are estimated by CBO.

- Funding for support accounts such as training and supply are related, when possible, to numbers of items of equipment and facilities.

The model thus estimates support requirements by assuming that funding per unit remains at current levels, adjusted for changes in force composition. The result can best be viewed as a baseline assuming "current-operations spending." The CBO model is not designed to estimate higher spending per ship, aircraft, and so forth, that might be needed if operating tempo or readiness is increased. Neither does the model estimate the cost of achieving an optimal degree of readiness.

The Resource Dynamics Model

The Resource Dynamics model uses a variety of estimating techniques to develop its projections, including the following features:

- MILPERS projections are based on estimates of primary and support manpower needs. Primary manpower is a function of the number and types of ships and aircraft in the fleet. Support manpower is, in turn, derived as a function of primary manpower using a series of empirical estimating relations.

- O&M projections are made by combining separate estimates for ship maintenance, aircraft maintenance, ship operations, and aircraft operations. Maintenance costs are estimated using relations that include unit value and age as factors. Operating costs are estimated using statistically derived relations that include ship factors, such as tonnage, generating capacity, steaming hours, and value, and aircraft factors, such as weight, thrust, flying hours, and value. Some miscellaneous items included in O&M are calculated as a function of the total Navy budget.

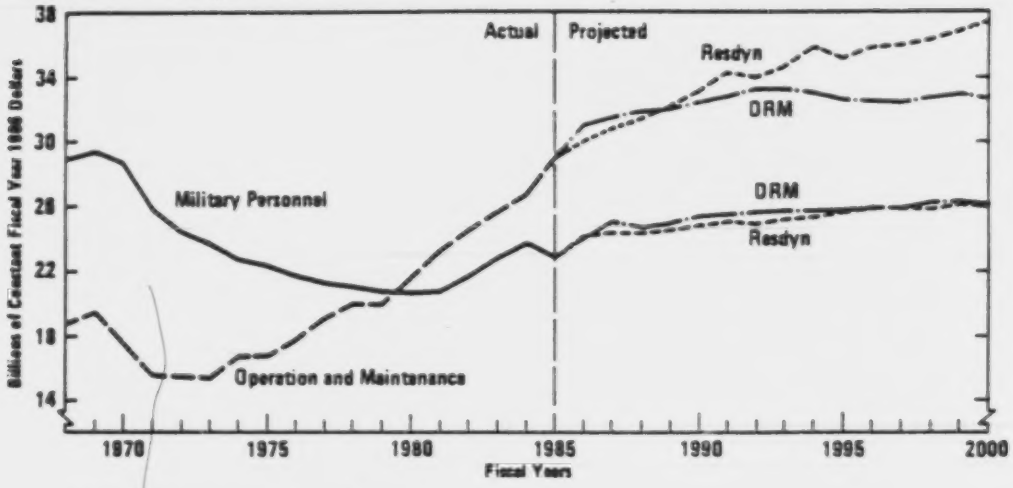
The RESDYN model, which has been used by Navy planners in making their own estimates of long-term budget requirements, produces somewhat higher estimates for future support costs than does the DRM. This is to be expected since the RESDYN model is sensitive to a rising fleet value whereas the DRM is not. A plot of historical trends in the Department of the Navy MILPERS and O&M accounts, together with future projections as made by the DRM and RESDYN models, is displayed in Figure 4.

Finally, a third, and simpler, method assumes that the total cost of military personnel plus operation and maintenance will maintain the same fraction of the total value of the fleet (that is, the total cost of all ships and aircraft, including major modifications) as it did in recent history. Although there are no persuasive theoretical reasons for believing that this ratio should be constant, the method does have empirical evidence to support it. A constant ratio suggests, for example, that a 10 percent increase in the value of ships increases all ship support requirements by 10 percent. But some support, such as port facilities, airfields, and administrative facilities, should not have to expand proportionately. On the other hand, the ratio has been roughly steady in recent years. Figure 5 shows the ratio from fiscal year 1970 through fiscal year 1984. Although there is some variation, it is not possible to dismiss the contention of a constant ratio from this data. Thus this study illustrates the effect of this method in some of its estimates. Specifically, Case III, described below, assumes that total support budget requirements remain at 18.1 percent of fleet value.

These various approaches to estimating future budgets are summarized in Table 7. About 76 percent of the budget is estimated directly or through the models and 24 percent is estimated through historically derived budget shares.

Figure 4.

Department of the Navy Support Costs—Past Trends and Future Projections

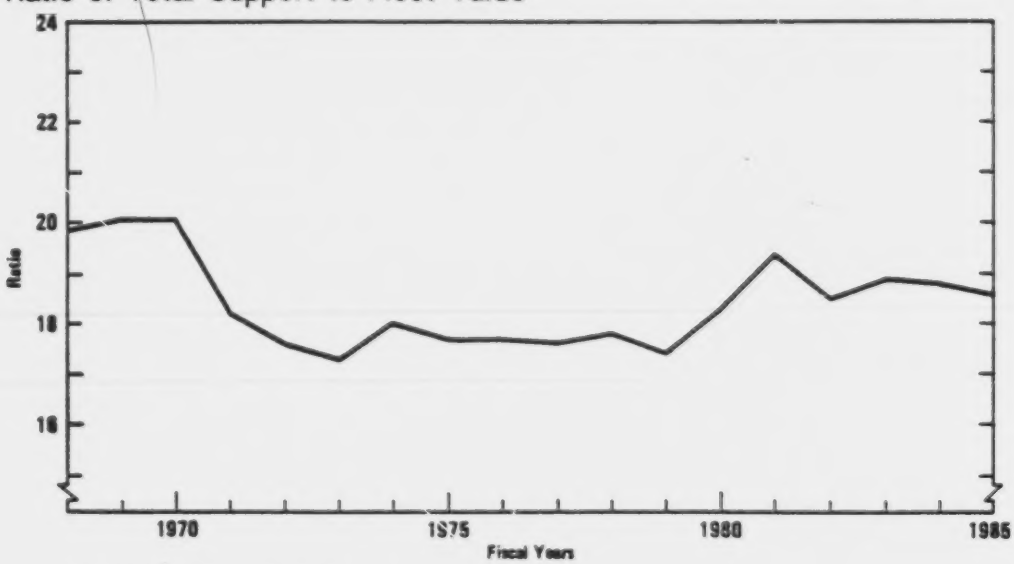


SOURCE: Congressional Budget Office.

NOTE: Projections by Defense Resources Model (DRM) and Resource Dynamics Model (Resdyn).

Figure 5.

Ratio of Total Support to Fleet Value



SOURCE: Congressional Budget Office.

TABLE 7. CBO METHODOLOGY FOR DEPARTMENT OF THE NAVY BUDGET PROJECTIONS

Navy Account	Estimating Method Used
Aircraft Procurement	Direct projection
Weapons Procurement	4.5 percent of budget
Shipbuilding & Conversion	Direct Projection
Other Procurement	5.6 percent of budget
Procurement Marine Corps	1.9 percent of budget
RDT&E	9.6 percent of budget
Military Construction	1.5 percent of budget
Operation & Maintenance	DRM/RESDYN models
Military Personnel	DRM/RESDYN models
Other	1.5 percent of budget
Direct Projection/Models	76 percent of total
Budget Shares	24 percent of total

SOURCE: Congressional Budget Office.

CHAPTER IV. PROJECTIONS OF FUTURE BUDGET REQUIREMENTS FOR THE DEPARTMENT OF THE NAVY

Future Navy budget requirements will depend upon a host of factors, some governed by future government policy decisions and others influenced by economic and other external conditions. The projections presented here assume policy decisions that CBO believes to be generally consistent with current Navy objectives and practice. They also assume a stable economic environment in that all budget figures are stated in terms of constant fiscal year 1986 dollars.

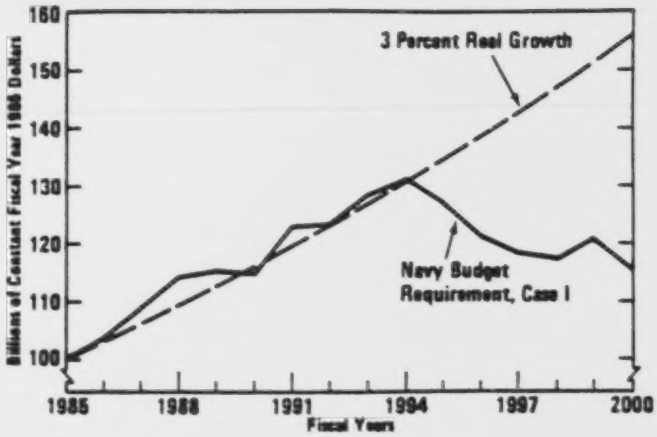
ALTERNATIVE BUDGET ESTIMATES

Probable future budget requirements for achieving and sustaining the Navy's stated force level and modernization goals are bracketed by three alternative cases, designated Cases I, II, and III. In Case I, it is assumed that no real growth occurs in procurement prices and that support costs grow relatively slowly, as is predicted by CBO's Defense Resources Model. This results in the lowest budget projection presented here. In Case II, it is assumed that ship and aircraft prices experience an average annual real growth of three percent per year and that support costs grow more rapidly, as predicted by the Resource Dynamics Navy Model. These assumptions result in a mid-range budget projection. Finally, in Case III, it is assumed that procurement prices are the same as in Case II (average annual 3 percent real growth in prices), but that support costs retain their current level as a fraction of total fleet value. This results in the highest budget projection.

These three cases and are displayed graphically in Figures 6, 7, and 8, and are specified in detail in Appendix Tables A-1, A-2, and A-3. The appendix tables display the basic results of this study, that is the appropriation, by account, that would be necessary each year through fiscal year 2000 to accomplish the Navy's objectives, given the assumptions of Cases I, II, and III, respectively. Figures 6, 7, and 8 display the Department of the Navy budget projections as contained in the tables. The constant three percent trend line shown in Figure 6 and the 5 percent trend lines shown in Figures 7 and 8 are included simply as indexes for comparison with the indicated budget requirements. Case I results in real growth at a rate of about 3 percent per year through fiscal year 1994, and Cases II and III require a real growth rate of about 5 to 6 percent for the same period to

Figure 6.

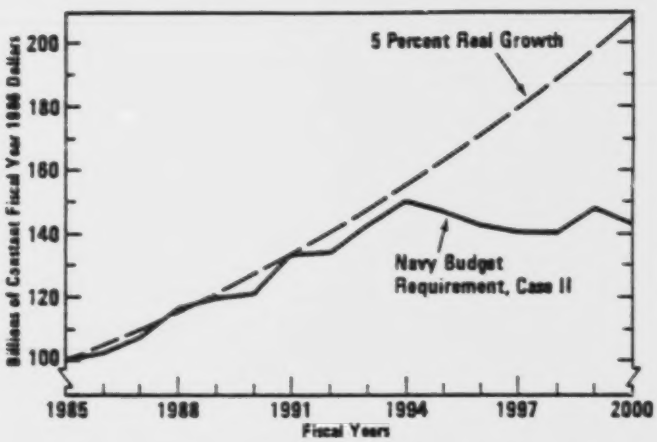
Projected Navy Department Budget Requirements, Using Case I Assumptions, Compared with 3 Percent Real Growth



SOURCE: Congressional Budget Office.

Figure 7.

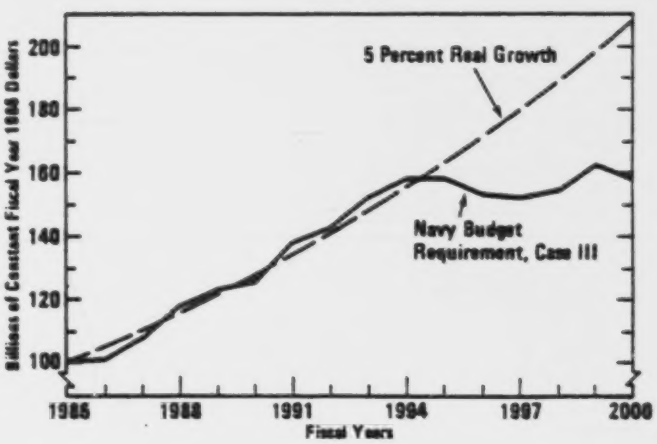
Projected Navy Department Budget Requirements, Using Case II Assumptions, Compared with 5 Percent Real Growth



SOURCE: Congressional Budget Office.

Figure 8.

Projected Navy Department Budget Requirements, Using Case III Assumptions, Compared with 5 Percent Real Growth



SOURCE: Congressional Budget Office.

achieve the Navy's planned force levels and modernization goals. The statistically averaged growth rates for the three cases are as follows: 1/

Case	Fiscal Years 1985-1994 Annual Real Growth Rate (In percents)	Fiscal Year 1994 Budget Estimate (In billions of Fiscal Year 1986 dollars)
I	2.9	130.7
II	4.6	150.1
III	5.6	158.6

After 1994, a small decrease or leveling of budgetary expenditures is predicted. Such projections obviously are much more uncertain as they proceed further into the future, but this leveling suggests that the Navy budget would reach a new equilibrium at about $150 billion annually (for Case II) after its current expansion program. This amount, however, is about twice the size of the Navy's budget in the 1960s and 1970s, as measured in dollars of constant purchasing power.

DISCUSSION OF RESULTS

Much of the growth projected in Cases I, II, and III is fueled by increases in the investment accounts. Under Case I, with no increases in unit procurement costs, annual growth in investment from 1985 through 1994 would average 4.5 percent a year. 2/ Under Cases II and III, in which there are assumed increases in unit procurement costs, overall investment growth

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1. By statistical average, CBO means the slope of a least squares regression over all the estimates made for the 1985-1994 period. The average growth considering just the end points, that is 1985 and 1994, is also about 3.0 percent for Case I, 4.6 percent for Case II, and to 5.2 percent for Case III.

2. Numbers in this section are based on the ratio of 1994 to 1985 costs and are computed in constant fiscal year 1986 dollars.

averages about 7.2 percent a year. This growth reflects the costs of attaining and maintaining a 600-ship Navy, while continuing to modernize with more expensive vessels. In addition, investment costs are high because of the need to buy more aircraft for the larger fleet. It should be noted that these continuing increases come on top of substantial past increases in investment. From 1980 through 1985, investment grew at an annual average rate of 9.8 percent.

Support costs contribute to growing costs but by lesser amounts than investment. The computer model estimates indicate that support costs will go up by an annual average rate of about 1.5 to 2.0 percent in the 1985-1994 period. The constant ratio to fleet value approach used in Case III predicts a higher growth rate for support of about 3.1 percent during that period. All support calculations, therefore, indicate slower growth in support than is projected for investment.

The models roughly parallel Navy plans for future manpower requirements, an area in which the Department of Defense does publish five-year projections. The Navy projects a need for a 7.5 percent increase in active-duty military personnel (from 571,000 to 614,000) between the end of fiscal year 1985 and the end of fiscal year 1990. The Resource Dynamics Navy Model projects a 7.2 percent increase in manpower during that period, while the DRM predicts a need for a 9.5 percent increase.

It is possible, however, that all of the above estimates of support costs are too low. By fiscal year 1995, the ratio of investment to support costs ranges from 1.1 under Case I to 1.34 under Case II. This compares to a ratio of 0.9 today and an average level of 0.7 in the 1970s. Thus all three cases assume that support costs will continue to decline as a fraction of the total budget. To the extent that support costs do not decline as projected here, total costs could be even higher than those estimated in this analysis.

Even the budget increases estimated here would be difficult to achieve if history is a guide. Since the end of World War II, the Navy has never sustained real increases in its budget for more than five consecutive years. The sustained 15-year expansion required to achieve and sustain the Navy's present plans would result in a historic change in budget trends.

The small decrease or leveling of budget requirements projected in the 1995 to 2000 period indicates a settling at a new budget norm after the force expansion that is now in progress. This new norm would be about twice the level, or higher, than that which prevailed for nearly three decades preceding 1980. Such a leveling, however, might not occur because by 1995 the Navy might be procuring entirely new kinds of weapons whose costs are now unknown.

The budget projections presented above are based on numerous assumptions that will affect the outcome. The assumptions are not immutable truths, however, and changes are always possible. These could include deliberate policy changes, including such decisions as:

- Changed force levels;
- Procurement of different kinds of ships and aircraft from those currently planned;
- Changed ship or aircraft service lives;
- Altered support practices;
- Changed readiness goals;
- Increased use of reserves;
- Changed operating tempo.

Changes might also occur in economic variables, such as:

- Ship and aircraft prices might change beyond the limits considered in this report.
- Price changes might occur in other items, such as fuel, spare parts, or electronic components.
- Real pay and benefits might change for military or civilian personnel.

These or other factors could affect the projections presented in this study.

APPENDIX

APPENDIX. DETAILS OF THE DEPARTMENT OF THE NAVY BUDGET ESTIMATES, FISCAL YEARS 1985-2000

This appendix contains tables that detail CBO's estimates of the budget requirements for the Department of the Navy that would be required during the period fiscal year 1985 through fiscal year 2000 to achieve and sustain the Navy's current force objectives.

Three cases are considered:

- **Case I:** Assumes no real growth in procurement prices and assumes the lowest support costs projected by the computer models used in this analysis. This results in a minimum projected budget requirement.

- **Case II:** Assumes an average 3 percent annual real growth in procurement unit prices (typical of recent experience) and the higher of the support costs projected by the computer models used in this analysis. This results in a middle-range projection.

- **Case III:** Assumes an average 3 percent annual real growth in unit procurement prices and that support costs remain at their recent level as a fraction of total fleet (ships plus aircraft) value rather than as a declining fraction, as both computer models suggest. This results in the highest of the three budget projections.

All budget numbers are expressed in terms of fiscal year 1986 appropriation dollars.

TABLE A-1. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 (In billions of constant fiscal year 1986 dollars)
CASE I: DEFENSE RESOURCES MODEL AND NO REAL GROWTH IN UNIT PRICES

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Procurement																
Aircraft	11.5	12.1	12.8	14.3	16.2	15.6	17.7	15.7	15.8	16.9	16.8	13.1	11.8	9.6	11.9	11.4
Weapons	4.6	4.8	5.0	5.2	5.3	5.3	5.7	5.7	5.9	6.0	5.8	5.6	5.4	5.4	5.6	5.3
Shipbuilding & Conversion	12.1	11.4	13.1	15.6	14.5	13.7	17.4	19.1	22.6	23.6	21.1	20.4	19.6	20.6	20.6	17.6
Marine Corps	1.9	1.3	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.7	1.6	1.6	1.5	1.5	1.6	1.5
Other	5.6	5.8	6.1	6.4	6.5	6.4	6.9	6.9	7.2	7.3	7.1	6.8	6.6	6.6	6.8	6.5
Subtotal, Procurement	35.7	35.4	38.4	43.0	44.0	42.5	49.3	49.0	53.2	55.5	52.5	47.4	45.0	43.7	46.4	42.3
Investment																
Research & Development	9.7	9.9	10.4	10.9	11.1	11.0	11.8	11.9	12.3	12.5	12.2	11.6	11.3	11.3	11.6	11.1
Military Construction	1.7	1.6	1.6	1.7	1.7	1.7	1.8	1.9	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.7
Subtotal, Investment	47.1	46.9	50.4	55.7	56.8	55.2	62.9	62.7	67.4	70.0	66.6	60.9	58.1	56.7	59.8	55.1
Support																
Operation & Maintenance	28.3	31.0	31.5	31.9	32.0	32.5	32.8	33.2	33.2	32.9	32.6	32.5	32.4	32.7	32.9	32.6
Military Personnel	23.7	24.0	25.0	24.7	24.9	25.3	25.5	25.7	25.8	25.8	25.8	25.9	25.9	26.2	26.3	26.1
Other	1.2	1.6	1.6	1.7	1.7	1.7	1.8	1.9	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.7
Subtotal, Support	53.2	56.6	58.1	58.3	58.6	59.5	60.1	60.8	60.9	60.7	60.3	60.2	60.1	60.7	61.0	60.4
Total Budget Authority	100.3	103.4	108.6	114.0	115.4	114.8	123.1	123.5	128.3	130.7	126.9	121.1	118.2	117.4	120.8	115.5

SOURCE: Congressional Budget Office, based on Navy Department data.

TABLE A-2. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 (In billions of constant fiscal year 1986 dollars)
CASE II: RESOURCE DYNAMICS MODEL AND 3 PERCENT REAL GROWTH IN UNIT PRICES

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Procurement																
Aircraft	11.5	12.5	13.6	15.6	18.2	18.1	21.1	19.3	20.0	22.1	22.6	18.1	16.8	14.1	18.0	17.9
Weapons	4.6	4.7	4.9	5.4	5.5	5.6	6.1	6.2	7.7	7.9	6.8	6.6	6.5	6.5	6.8	6.6
Shipbuilding & Conversion	12.1	11.7	13.9	17.0	16.3	15.9	20.8	23.5	28.6	30.8	28.4	28.2	27.9	30.3	31.2	27.4
Marine Corps	1.9	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.9	2.0	1.9	1.9	1.8	1.8	1.9	1.9
Other	5.6	5.7	6.0	6.5	6.7	6.8	7.5	7.5	8.0	8.4	8.2	8.0	7.9	7.9	8.3	8.0
Subtotal, Procurement	35.7	36.0	39.8	46.1	48.4	47.9	57.2	58.2	65.1	70.1	67.5	62.8	60.9	60.5	66.2	61.6
Investment																
Research & Development	9.7	9.8	10.3	11.2	11.5	11.6	12.8	12.9	13.7	14.4	14.1	13.7	13.5	13.5	14.2	13.7
Military Construction	1.7	1.5	1.6	1.7	1.8	1.8	2.0	2.0	2.1	2.3	2.2	2.1	2.1	2.1	2.2	2.1
Subtotal, Investment	47.1	47.3	51.8	59.0	61.7	61.3	72.1	73.1	80.9	86.8	84.2	78.6	76.5	76.0	82.6	77.5
Support																
Operation & Maintenance	28.3	30.0	30.8	31.5	32.1	33.1	34.3	34.0	34.6	35.9	35.1	35.9	36.0	36.2	36.9	37.3
Military Personnel	23.7	24.1	24.3	24.3	24.5	24.8	25.0	24.9	25.1	25.2	25.6	25.9	25.9	25.9	26.1	26.0
Other	1.2	1.5	1.6	1.7	1.8	1.8	2.0	2.0	2.1	2.3	2.2	2.1	2.1	2.1	2.2	2.1
Subtotal, Support	53.2	55.6	56.7	57.6	58.4	59.7	61.3	60.9	61.8	63.3	62.9	63.9	64.0	64.2	65.2	65.5
Total Budget Authority	100.3	103.0	108.5	116.6	120.1	121.0	133.4	134.0	142.7	150.1	147.0	142.5	140.5	140.2	147.8	143.0

SOURCE: Congressional Budget Office, based on Navy Department data.

TABLE A-3. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 (In billions of constant fiscal year 1986 dollars)
CASE III: ASSUME CONSTANT SUPPORT FLEET VALUE RATIO AND 3 PERCENT REAL GROWTH IN UNIT PRICES a/

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Procurement																
Aircraft	11.5	12.5	13.6	15.6	18.2	18.1	21.1	19.3	20.0	22.1	22.6	18.1	16.8	14.1	18.0	17.8
Weapons	4.6	4.6	5.0	5.4	5.6	5.8	6.4	6.5	7.0	7.3	7.3	7.0	7.0	7.1	7.5	7.3
Shipbuilding & Conversion	12.1	11.7	13.9	17.0	16.3	15.9	20.8	23.5	28.6	30.8	28.4	28.2	27.9	30.3	31.2	27.4
Marine Corps Procurement	1.9	1.3	1.4	1.5	1.6	1.6	1.8	1.8	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.1
Other	5.6	5.6	6.0	6.6	6.9	7.0	7.7	8.0	8.5	8.9	8.9	8.6	8.5	8.7	9.1	8.8
Subtotal, Procurement	35.7	35.8	39.9	46.1	48.7	48.4	57.8	59.2	66.1	71.1	69.2	64.0	62.3	62.1	67.8	63.3
Investment																
Research & Development	9.7	9.7	10.4	11.2	11.8	12.0	13.3	13.7	14.6	15.2	15.2	14.7	14.6	14.8	15.6	15.2
Military Construction	1.7	1.5	1.6	1.8	1.8	1.9	2.1	2.1	2.3	2.4	2.4	2.3	2.3	2.3	2.4	2.4
Subtotal, Investment	47.1	47.0	51.9	59.1	62.3	62.3	73.1	75.0	83.0	88.6	86.7	80.9	79.1	79.3	85.8	80.9
Support																
Operation & Maintenance + Military Personnel	52.0	52.3	54.5	56.2	58.6	61.1	62.9	65.2	66.7	67.6	69.3	69.7	70.6	72.9	73.9	74.6
Other	1.2	1.5	1.6	1.8	1.8	1.9	2.1	2.1	2.3	2.4	2.4	2.3	2.3	2.3	2.4	2.4
Subtotal, Support	53.2	53.8	56.1	58.0	60.4	63.0	65.0	67.3	69.0	69.9	71.7	72.0	72.9	75.2	76.3	77.0
Total Budget Authority	100.3	100.7	108.0	117.1	122.7	125.3	138.1	142.3	152.0	158.6	158.4	153.0	152.0	154.5	162.1	157.8

SOURCE: Congressional Budget Office, based on Navy Department data.

a. The assumed 3 percent annual real growth in unit prices is reflected in the procurement estimates only, not in calculating support costs.